

REMARKS

Applicants thank the Examiner for total consideration given the present invention. Currently, claims 1-9 and 11-16 are pending of which claims 13-16 are withdrawn from consideration as directed to non-elected claims. Claim 1 is independent. In response to the Office Action of June 20, 2006, rejecting pending claims 1-9, 11 and 12, Applicants respectfully request the Examiner to reconsider and withdraw the rejection in view of the amendment and the following remarks.

Claim Objection

Claim 1 stands objected for not inserting "a" after "associated with" on line 3 of the claim. Applicants disagree with the Examiner's assertion that "a" should be inserted after "associated with" on line 3 of the claim. Nevertheless, Applicants have amended claim 1 to include "a" after "associated with" on line 3 of the claim in order to expedite prosecution. Thus, the Examiner is respectfully requested to withdraw this objection.

Applicants respectfully submit that the amendment made to claim 1 is editorial in nature and do not add any new matter to the application and they are not narrowing, and are not made for a reason relating to patentability. Accordingly, it is submitted that the amendment do not give rise to estoppel and, in future analysis, claim 1 is entitled to its full range of equivalents.

Rejection under 35 U.S.C. § 103

Claims 1-9, 11 and 12 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Miller (US 6,123,671) or Cole et al. (US 6,363,033) when taken in view of Hossack et al. (US 6,226,228). This rejection is respectfully traversed.

The Office Action Fails to Establish a Prima Facie of Case of Obviousness

It is also respectfully submitted that the rejection of 1-9, 11 and 12 in June 20, 2006 Office Action fails to establish a prima facie case of obviousness. In order to establish a prima facie case of obviousness, a rejection made under 35 U.S.C. § 103 must meet three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

a. The Cited References Do Not Disclose The Features Of Independent Claim 1

Applicants respectfully submit that the cited references do not disclose the features of independent claim 1. More specifically, there is no disclosure in any of the cited references of, at least, "wherein said transmitting beamformer generates a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal, further wherein the control signal is based upon at least one channel dependent parameter" (emphasis added).

The Office Action acknowledges that neither Miller nor Cole teach the above identified claim feature. (See page 3, paragraph 4 of the Office Action). Thus, the Examiner imports Hossack to remedy the deficiency of Miller or Cole. It is respectfully submitted that there is no disclosure in Hossack of, at least, "wherein said transmitting beamformer generates a control signal, for each channel, for controlling pulse durations of a reference signal to generate a

carrier drive signal, further wherein the control signal is based upon at least one channel dependent parameter" (emphasis added).

Hossack is directed to an ultrasound imaging system to improve imaging with nonlinear contrast agents. In order to improve such imaging system, Hossack utilizes steps or structures for transmitting ultrasonic energy at a fundamental frequency and receiving reflected ultrasonic energy at a harmonic of the fundamental frequency and uses various conventional filtering techniques. (Col. 1, lines 44-56). Hossack's system includes a transmit beamformer 120 which includes a pulse generator 122. However, Hossack is silent on whether the transmit beamformer can generate a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal, wherein the control signal is based upon at least one channel dependent parameter. The Examiner alleges that Hossack teaches in col. 13, lines 52-65 the above identified claim feature. Applicants respectfully submit that the Examiner's interpretation of the cited section is erroneous. The section relied upon by the Examiner merely teaches a conventional technique of reducing harmonic response in ultrasonic imaging. In order to do that the conventional technique includes a step of generating pulse width modulated waveform. Applicants respectfully submit that such step of generating pulse width modulated waveform cannot be properly be interpreted as generating a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal, wherein the control signal is based upon at least one channel dependent parameter, as required by independent claim 1. Accordingly, a rejection of independent claim 1 would be improper.

As argued in previous response, Cole merely discloses a digital transmit beamformer system with multiple beam transmit capability which has a plurality of multi-channel

transmitters, each channel with a source of sampled complex-valued initial waveform information to be applied to one or more corresponding transducer elements for each beam. (See abstract.) Furthermore, Cole discloses an ultrasound system R-20 which includes a transmit multiplexer T-106 for routing output waveforms from the transmitters T-103 to the transducer elements T-114 (column 11, lines 5-9; Fig. 2a.) Specifically, Cole discloses a medical ultrasound imaging system which includes a digital transmit beamformer system T-102 which includes a digital to analog converters T-121 and amplifiers T-123. Such system is different in that Cole supplies analog signals to the transducers whereas the instant invention supplies digital signals to the transducers.

On the other hand, Miller merely discloses an ultrasound system where a plurality of delay calculators are distributed throughout a beamformer. Each delay calculator provides beamforming delays and apodization values for a plurality of channels/elements. (See abstract.) Specifically, Miller discloses an architecture for calculating beamformer time delays and apodization values in real time by using a cordic rotator, a simple multiplier-less device used for polar-Cartesian conversions. The use of the cordic rotator to directly calculate the root-sum-of-squares without approximation or complex logic provides cost and performance advantages. (See column 2, line 63 through column 3, line 4.) Miller's beamformer is different in that Miller is directed to a receiving beam forming system (Col. 4, lines 13-34) whereas the instant invention is directed to a transmitting beamformer to generate a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal, wherein the control signal is based upon at least one channel dependent parameter.

Thus, it is respectfully submitted that the cited prior arts do not disclose the features of independent claim 1. Accordingly, a rejection of independent claim 1 would be improper.

b. There is No Motivation to Combine the Cited References

It is respectfully submitted that the three cited references taken either alone or in combination do not recognize the problem solved by the Applicant's claimed invention or include all the features of independent claims. More specifically, the Applicant's claimed invention solves the unrecognized problem of transmit beamforming in sonar systems or methods by generating a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal wherein the control signal is based upon at least one channel dependent parameter. Moreover, it is respectfully submitted that only a person skilled in the art who had access to the present application would be motivated to combine the teachings of the cited prior art references in order to solve the unrecognized problem disclosed in Applicant's specification. In other words, the only motivation to combine the cited references in the way suggested in the Office Action is gleaned from the hindsight provided by Applicant's specification.

The Applicants respectfully submit that the Office Action is based upon a selective combination of features found in the references, and that such selective combining is impermissible. As stated in *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985), "When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." It is respectfully submitted that the Office Action cites Miller

or Cole, and then utilizes the present application as a road map to selectively replace or add various features of Miller or Cole with Hossack.

The Office Action admits that neither Miller nor Cole teaches at least, "wherein said transmitting beamformer generates a control signal, for each channel, for controlling pulse durations of a reference signal to generate a carrier drive signal, further wherein the control signal is based upon at least one channel dependent parameter" (emphasis added), but alleges that it would be obvious to modify either Miller or Cole in view of Hossack to control pulse widths (durations) of a reference signal to generate the carrier drive signal so as to reduce harmonic frequency transmissions. It is respectfully submitted that the rejection of claim 1 is a blatant string of substitutions gleaned from and motivated by the Applicant's own patent application. The Office Action has not shown that the prior art provides the teaching or suggestion to make the claimed combination and the reasonable expectation of success. The suggestion to make the claimed combination and the reasonable expectation of success cannot be based on Applicant's disclosure. Accordingly, it is respectfully submitted that independent claim 1 and its dependent claims are patentable over the impermissible combination of references cited against the claims.

It is also respectfully submitted that claims 2-9, 11, and 12, which depend from claim 1, are patentable over the cited prior art for at least the same reasons as claim 1. In addition, Applicants respectfully submit that the dependent claims include features that are not specifically addressed by the Examiner. The Examiner broadly asserts that dependent claims 2-9, 11, and 12 are further provided by the combination of the above noted prior art without pointing to specific teachings of the cited references with respect to the claimed features. Thus, it is respectfully

submitted that the Office Action failed to establish a Prima Facie of Case of Obviousness with respect to claims 2-9, 11, and 12.

CONCLUSION

In view of the above remarks, it is believed that claims 1-9, 11, and 12 clearly distinguish over the references relied on by the Examiner either alone or in combination.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Ali M. Imam (Reg. No.58,755) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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